CLAIMS

What is claimed is:

1. An electronic assembly comprising:

a substrate,

a device attached to the substrate;

a thermally conductive heat spreader covering the device and at least a portion of the substrate; and

a metal interposed between the device and the thermally conductive heat spreader, the metal having a lower melting point than the melting point of the thermally conductive heat spreader.

2. The electronic assembly of claim 1 wherein the thermally conductive heat spreader further comprises:

at least one column of the lower melting point metal.

3. The electronic assembly of claim 1 wherein the thermally conductive heat spreader is cup-shaped.

4. The electronic assembly of claim 1 wherein the thermally conductive heat spreader further comprises:

a plate; and

four sidewalls attached to the plate, the four sidewalls substantially surrounding the device attached to the substrate.

5. The electronic assembly of claim 1 wherein the device includes a die.

6. The electronic assembly of claim 5 further comprising an underfill material located between the substrate and the die to prevent metal from entering the volume between the die and the substrate.

7. The electronic assembly of claim 5 further comprising an encapsulation material covering the die.

8. The electronic assembly of claim 1 wherein the device further includes:
a first die; and
a second die.

9. The electronic assembly of claim 7 wherein the first die and the second die are stacked.

10. The electronic assembly of claim 9, wherein the first die and a second die are covered with an encapsulating material.

11. The electronic assembly of claim 1 further comprising a heat sink thermally attached to the thermally conductive heat spreader.

12. The electronic assembly of claim 1 wherein the metal substantially filling the space between the device and the thermally conductive heat spreader is a solder material.

13. The electronic assembly of claim 1 wherein the metal substantially filling the space between the device and the thermally conductive heat spreader includes indium.

14. The electronic assembly of claim 5 wherein the device further comprises another component attached to the substrate.

15. The electronic assembly of claim 14 wherein the other component is covered with an encapsulating material.

16. The electronic assembly of claim 14 wherein an underfill material is placed between the other component and the substrate.

17. The electronic assembly of claim 1 wherein at least one of the surfaces in contact with the interposed metal includes a wetting material.

18. A method comprising:

attaching a die to a substrate;

heating a mold;

placing a thermally conductive heat spreader into the mold;

placing the substrate into the mold; and

flowing a molten metal material into contact with the thermally conductive heat spreader and the die.

19. The method of claim 18 further comprising underfilling the space between the die and the substrate.

20. The method of claim 18 further comprising encapsulating the die.

21. The method of claim 18 wherein flowing a molten metal material into contact with the thermally conductive heat spreader and the die includes flowing a molten metal material through a gate in the mold and a gate in the thermally conductive heat spreader.

22. The method of claim 18 further comprising cooling the mold and the thermally conductive heat spreader to solidify the molten metal material.

23. The method of claim 18 further comprising placing a pressure on the molten metal material.

24. The method of claim 23 wherein placing a pressure on the molten metal includes maintaining a pressure substantially during flowing a molten material.

25. The method of claim 18 further comprising removing reactive components from the space between the die and the thermally conductive heat spreader.

26. The method of claim 25 wherein removing reactive components from the space between the die and the thermally conductive heat spreader further includes:

initially drawing a vacuum on the space between the die and the thermally conductive heat spreader; and

purging the space between the die and the thermally conductive heat spreader with a second gas.

27. The method of claim 26 wherein the second gas is less reactive than the first gas.

28. The method of claim 26 further comprising drawing a second vacuum on the space between the die and the thermally conductive heat spreader.

29. The method of claim 26 wherein the second gas is an inert gas.

30. The method of claim 18 further comprising adding a wetting layer to at least one of the surfaces associated with the space between the substrate and the thermally conductive heat spreader.

31. The method of claim 12 further comprising stacking a second die onto the first die.

32. The method of claim 31 further comprising encapsulating the first die and second die.

33. The method of claim 18 further comprising:
adding at least one other component to the substrate;
underfilling the at least one other component; and
encapsulating the at least one other component.

34. A method comprising:
attaching at least one die to a substrate;
placing a thermally conductive heat spreader over the die; and
interposing a molten metal material between the thermally conductive heat spreader and the die.

35. The method of claim 34 further comprising attaching a second die onto the substrate.

36. The method of claim 34 further comprising stacking a second die onto the at least one die attached to the substrate.

37. The method of claim 34 further comprising cooling the molten metal material after the space between the at least one die and the thermally conductive heat spreader was filled with the molten metal material.

38. The method of claim 37 further comprising pressurizing the molten metal material.

39. The method of claim 34 further comprising underfilling the space between the die and the substrate.

40. The method of claim 34 wherein interposing a molten metal material further comprises removing the molten metal material from a portion of a vessel that is not exposed to the atmosphere.

41. The method of claim 34 further comprising adding a wetting layer to at least one surface in the space between the die and the substrate.